

NEW EULOPHIDAE (HYMENOPTERA) REARED FROM CITRUS
LEAFMINER, *PHYLLOCNISTIS CITRELLA* STANTON (LEPIDOPTERA:
GRACILLARIIDAE)

MICHAEL E. SCHAUFF

Systematic Entomology Laboratory, PSI, Agricultural Research Service, U.S. Department of Agriculture, % National Museum of Natural History, MRC-168, Washington, DC 20560, U.S.A. (e-mail: mschauff@sel.barc.usda.gov).

Abstract.—Two new species of Eulophidae, *Pediobius puertoricensis* and *Chrysocharodes lasallei* (Hymenoptera: Eulophidae: Entedoninae) reared from the citrus leafminer, *Phyllocnistis citrella* Stainton (Lepidoptera: Gracillariidae) from Puerto Rico and Colombia, respectively, are described and illustrated.

Key Words: Biological control, taxonomy, Chalcidoidea, Eulophidae, citrus leafminer

The citrus leafminer, *Phyllocnistis citrella* (Stainton) (CLM), occurs naturally with citrus in much of Asia and in recent years has spread throughout most of the citrus growing regions of the world (Heppner 1993, Schauff et al. in press), most recently invading the Neotropics. In most of these regions, CLM has become a significant pest of cultivated citrus and has become the focus of a great deal of research. As part of the effort to establish effective biological control of this pest, researchers have been rearing numerous parasitoids, many of which have not been reliably identified to species. Most of these species appear to be parasitoids of native leafminers in areas adjacent to citrus groves which are moving onto CLM. These fortuitous parasitoids are having a major impact on the leafminer in several countries (Cano 1996, Cano et al. 1996, Castaño et al. 1996, Castro et al. 1996, Cave 1996, de la Llana 1996, Perales and Garza 1996, Perales et al. 1996, Peña et al. 1996, LaSalle and Peña in press). In order to supply scientific names to researchers working on CLM control, I am describing these two species which I have determined to be new to science.

The genera of chalcidoid parasites attacking citrus leafminer were reviewed by Schauff et al. (in press). Both of these new species fit within genera already reported as attacking CLM. Both are from the family Eulophidae, subfamily Entedoninae as defined by Schauff (1991).

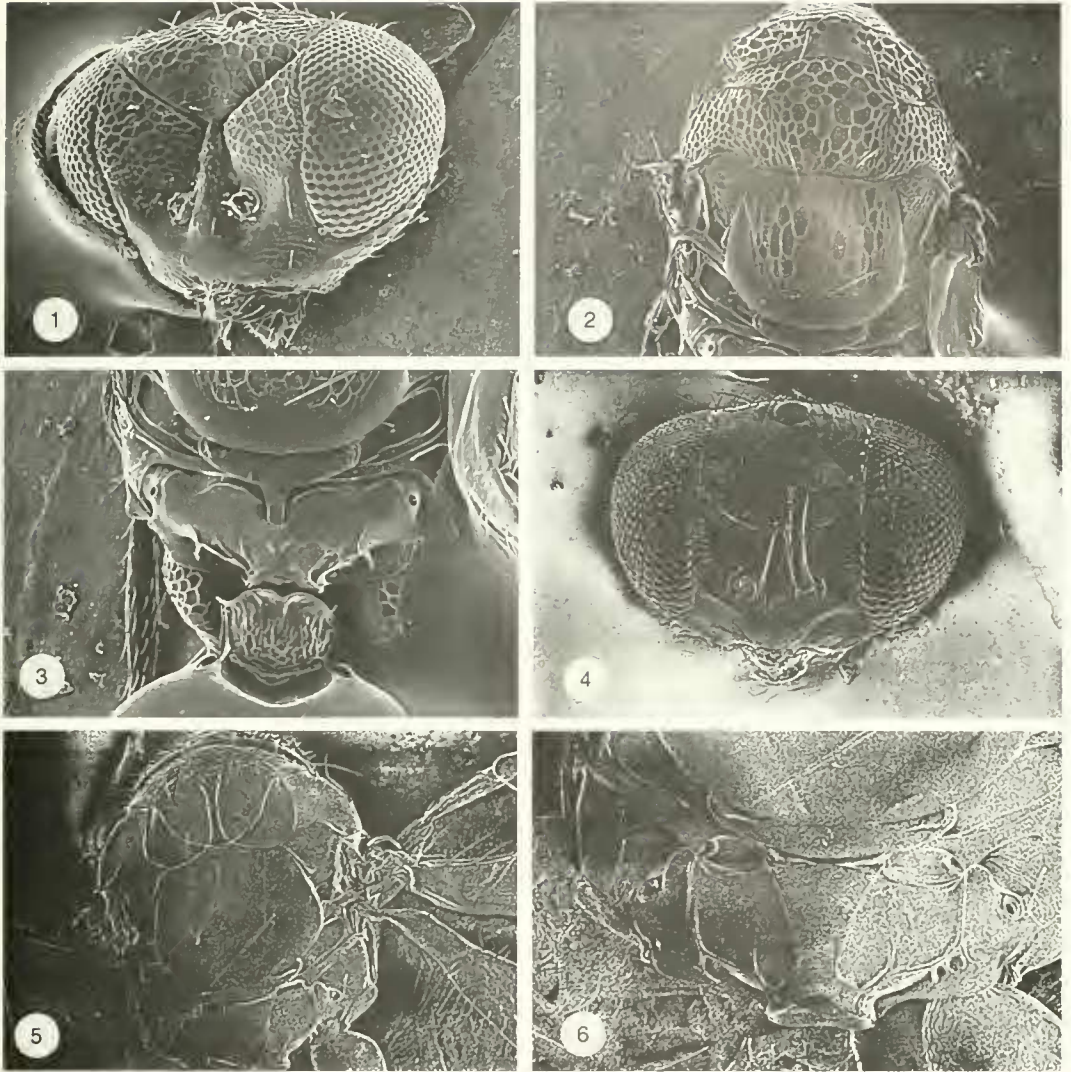
Abbreviations for museums are: (USNM) National Museum of Natural History, Smithsonian Institution, Washington, D.C. (BMNH) The Natural History Museum, London; (CNC) Canadian National Collection, Ottawa.

Pediobius puertoricensis Schauff, new
species

(Figs. 4–6, 8, 10)

Diagnosis.—Head and thorax shiny metallic green; mesocutum anteriorly punctate to reticulate, posterior $\frac{2}{3}$ shiny metallic, with large notaular foveae and broad median sulcus (Fig. 5); scutellum, axillae, and propodeum all smooth, shiny; median propodeal carinae well separated anteriorly and diverging posteriorly (Fig. 6).

This species is easily separated from other *Pediobius* by the structure of the mesos-



Figs. 1-6. Scanning Electron Micrographs. 1-3, *Chrysocharodes lasallei*. 1, Head. 2, Dorsal thorax. 3, Propodeum and petiole. 4-6, *Pediobius puertoricensis* (uncoated material). 4, Head. 5, Dorsal thorax. 6, Propodeum.

cutum. I know of no other species with a broad longitudinal median sulcus adjacent to the large notaular foveae, although there are hints of the beginning of such a sulcus in species such as *P. ropalidiae* (Risbec) (Kerrich 1973). In addition, most species have at least some sculpture on the scutellum. While these characters are unusual for *Pediobius*, they are found in other genera of Entedoninae and I do not feel that this species warrants separate generic status. The longitudinal sulcus medially on the me-

soscutum is certainly the most obvious difference and I do not doubt that some authors would accord this species generic status based on this character alone. However, erecting such a genus might render *Pediobius* paraphyletic and I do not feel that to be a wise course at this time. Further study of Neotropical eulophids may indicate that a separate genus is warranted.

Pediobius is generally defined by the presence of paired submedian carinae on the propodeum (Schauff 1991) and while

the structure of these carinae in *puertoricensis* is somewhat different than in most species, I feel that it falls within acceptable limits for the genus as currently defined.

There are few keys to *Pediobius* species, but in the most recent (Peck 1985), this species would key to either *P. tenerus* (Walker) or *P. foveolatus* (Crawford). The characters of the mesoscutum and smooth scutellum would separate it immediately from these two.

Description.—Female. Body length 1.2 mm. Color metallic green to black except: scape, legs beyond coxae yellow; antennal funicle brown. **Head:** Antenna with 3-segmented funicle (Fig. 8). Vertex smooth with numerous scattered silvery setae, occiput carinate medially with an elongated pair of setae laterally; face (Fig. 4) smooth, fronto-facial groove broadly U-shaped, intersected medially by raised interantennal prominence formed by scrobal grooves, with a single row of setae along eye margin, area below toruli with about 5 pairs of setae; eyes large, setose, eye height: malar space 40:15. **Mesosoma:** Pronotum collarlike, punctately sculptured anteriorly, smooth posteriorly; sculptured part with scattered silvery setae, with 3 pairs of elongated setae spread over posterior margin of sculptured area. Mesoscutum irregularly reticulate anteriorly, mostly smooth and shiny posteriorly and laterally, with deep, wide median groove in posterior $\frac{2}{3}$ (Fig. 5) and with wide and shallow notaular foveae extending to margin of scutellum. Scutellum smooth and shiny; axillae smooth and slightly advanced forward of scutellum. Metanotum narrow, shiny, with a pair of small setae laterally. Propodeum (Fig. 6) mostly smooth, with a raised median area with diverging margins, step-like plicae, small rounded spiracle removed about $2\times$ its diameter from 2 spiracular setae, and posteriorly with paired submedian carinae. Petiole as wide as long, dorsally rugose with irregular longitudinal carinae. **Metasoma:** Ovate, slightly longer than wide, first tergum about $2\times$ as long as tergum 2, with a

pair of large oval membranous openings adjacent to petiolar foramen. **Forewing:** As in Fig. 10.

Male. Body length 0.8–1.2 mm. Similar to female except for following: scape black, expanded apically; metasoma with white spot on dorsum anteromedially.

Types.—Holotype ♀ (USNM), "Puerto Rico, Limani Research Center, 30 April, 1996. Coll. M. Pomerinke. Host citrus leaf-miner". Paratypes: 1 ♂ with same data as holotype. 2 ♂: Puerto Rico, Utuado, Highway 140, Carlos Valez. 30 April, 1996. M. Pomerinke. Host citrus leafminer. 1 ♂, 1 ♀, Puerto Rico, Adjuntas, A.E.S. Limani, Citrus (*Cleopatra* cv.) rootstock, Feb. 6, 1996. Coll. E. Hernández. 1 ♂ and 1 ♀ paratype deposited in BMNH.

Etymology.—The species epithet is from the locality of the type series.

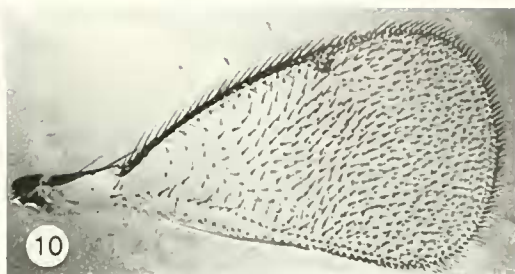
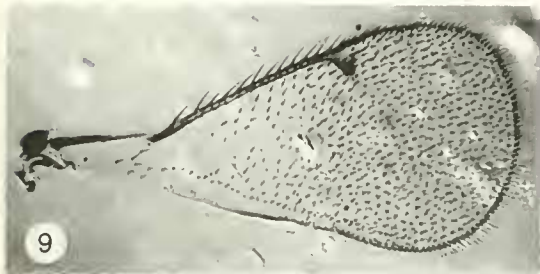
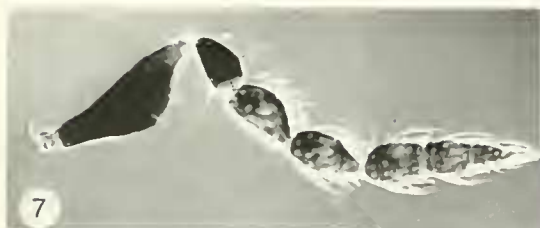
***Chrysocharodes lasallei* Schauff,**
new species
(Figs. 1–3, 7, 9)

Chrysocharodes sp. (Schauff et al., in press).

Diagnosis.—Scutellum as long as wide or wider than long, with open meshed reticulation covering most of dorsal surface, only becoming longitudinally reticulate/striate at lateral margin (Fig. 2); propodeum with median inverted U-shaped furrow extending about $\frac{1}{2}$ length of propodeum and abutting indistinct median carina (Fig. 3); femora and apices of tibiae dark.

This species is differentiated from *C. petiolata*, the only other described species in the genus (Bouček, 1977) (lectotype, BMNH, examined), by the following: scutellum of *petiolata* with only about 2 rows of open reticulation medially, then becoming longitudinally striate laterally; propodeum with median U-shaped furrow extending about $\frac{2}{3}$ length and abutting very short median carina; femur and tibia pale yellow (only middle legs present on lectotype, but all legs are probably yellow).

Chrysocharodes is a poorly known New World genus with no formal definition of



Figs. 7-10. Micrographs. 7, *Chrysocharodes lasallei*, female antenna. 8, *Peditobius puertoricensis*, antenna. 9, *C. lasallei*, forewing. 10, *P. puertoricensis*, forewing.

what unique features define the group. The pattern of carinae on the propodeum are different than in allied genera and would seem to be shared and apomorphic. The sculpturing of the mesoscutum and scutellum (wide, open messed reticulation) is certainly different from most allied species, but this is more a matter of degree and represents more continuous variation and is not definitely apomorphic.

Description.—Female. Body length 1.2–1.5 mm. Color black with metallic bluish reflections except for the following: scape becoming slightly lighter at apex, anterior $\frac{1}{3}$ to $\frac{1}{4}$ of all tibiae black to dark brown, posterior $\frac{2}{3}$ to $\frac{3}{4}$ yellow; tarsi yellow except dark brown at apex. **Head:** Antenna (Fig. 7) with scape expanded medially, funicle 2-segmented, club 3-segmented. Face below toruli irregularly striate to reticulate, laterad and above scrobal and frontal-facial grooves reticulate (Fig. 1). Mandible with 2 acute teeth, third tooth reduced to a small bump above second tooth. Vertex reticulate, except smooth laterad and posterior to occiput slightly carinate medially. Gena reticulate, malar suture indistinct, apparently absent in some specimens. Frontal-facial suture broadly V-shaped, intersected me-

dially by raised interantennal prominence formed by scrobal grooves. **Mesosoma:** Pronotum (Fig. 2) reticulate anteriorly and laterally, becoming smooth postero-medially. Mesoscutum reticulate, notauli visible anteriorly, with sunken notaular alveoli posteriorly. Axillae reticulate, projecting slightly forward of anterior edge of scutellum. Scutellum reticulate, becoming smooth along posterior margin. Metanotum smooth. Propodeum smooth with a partial median carina abutting median u-shaped carina anteriorly (Fig. 3), laterally with small irregular carinae projecting forward from posterior margin. Petiole slightly wider than long, anterior edge carinate, dorsally rugose with incomplete longitudinal carinae. **Metasoma:** Ovate, slightly longer than wide, first tergum approximately $2\times$ as long as second, smooth, shiny, metallic; remaining terga black, reticulate anteriorly, becoming smooth posteriorly. **Forewing:** Hyaline, less than $2\times$ as long as wide; length of postmarginal vein subequal to stigmal vein (Fig. 9).

Male. Body length 0.9–1.3 mm. Similar to female except for following. Color. Legs slightly lighter brown, tibiae and tarsi occasionally very light yellow, almost white.

Metasoma black to brown. Scape with thin sensillar ridge on ventral surface. Metasoma about 1.5 times as long as broad, first tergite 2–3× as long as second, smooth, nonmetallic.

Types.—Holotype ♀ (USNM) with data “Colombia, Valle, LaUnion, 27-IV-96, M. Cobo, A. Trochez. *Citrus* spp., ex. *Phyllocnistis citrella*. Paratypes. 9 ♀, 10 ♂ with same data as holotype, 4 ♀ and 4 ♂ with same data except collected 12-V-96. Paratypes deposited in USNM, BMNH, and CNC.

Etiology.—Named in honor of my colleague Dr. John LaSalle who has done a great deal of work on the taxonomy of the parasites of the citrus leafminer.

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